REMARKS/ARGUMENTS:

Claims 1-23 are pending in this Application. In a second non-final Office Action dated July 27, 2005, the Examiner has asserted the following claim rejections:

claims 1, 3, 7, 10-11 and 13-19 under 35 USC 101;

claim 1 under 35 USC 112, first paragraph; and also as being anticipated by Park;

claims 3-6, 10 and 21-22 as being obvious over Park in view of Ramchandran;

claim 11 as being obvious over Park in view of Ramesh; and

claims 11-16 as being obvious over Park, Ramesh, and Ramchandran.

The referenced Office Action further ruled claims 2 and 12 allowed, and claims 8-9, 20, and 23 allowable but for their dependency from a rejected base claim. The Applicant notes that claim 20 depends from allowed claim 12, so the objection to claim 20 is seen as error and claim 20 is considered as allowed. If this is incorrect and the Examiner considers this Amendment not fully responsive as to claim 20, the undersigned requests that the Examiner initiate a teleconference so that the undersigned might better understand and address the objection to claim 20.

The independent claims are grouped as follows: claims 1, 2, 4, 7 and 21-22 are directed to a method, whereas claims 11, 12, 14 and 17 are directed to a transmitter.

Respecting the rejection under 35 USC 101, an applicant need provide only one credible assertion of specific and substantial utility for each claimed invention to satisfy the utility requirement (MPEP 2107 and 2107.02). The application shows specific and substantial utility at Figure 3 and associated text at page 15, lines 10-28, which describes bits encoded at a trellis coder which are then correlated to points on a space-time signal constellation by a symbol mapper. The symbols are modulated onto a carrier frequency and transmitted. This is seen as sufficient to meet the utility requirement, given the presumption in favor of the Applicant. (MPEP 2107.02, part III A and cited cases). Since none of the dependent claims 3, 10, 13, 15-16, or 18-19 specify a different utility than the independent claim from which they depend, each of these are seen as meeting the requirements of 35 USC 101. (MPEP 2107.02, part I).

It is noted that the claims further detail the signal constellation, which is described at page 3, lines 23-32. Where points of the signal constellation are separated by a distance based on a conditional distribution as claimed, statistics of channel fading may be incorporated directly into the signal constellation by the conditionally-distributed separation between points, as set forth at page 5 line 28 to page 6 line 8. This greatly simplifies the receiver's task of resolving a received signal in fast fading environments. A fast fading environment or channel exists when the channel coherence interval (the time period over which an estimate of a channel remains valid) is shorter than the interval between actual determinations of current channel conditions. In a fast-fading channel then, there are periods when the receiver receives a signal but does not have accurate information about the channel carrying that signal. This renders the receiver's isolation of the intended signal from noise (e.g., other peripheral signals) in the partially unknown channel a more complex task. Where the signal carries symbols whose separation distance carries information about how the channel is changing, the receiver can use that information to better resolve and anticipate the channel at any instance, effectively reducing its coherence interval. One skilled in the art would consider a method to do this (e.g., as encompassed by claims 1, 3, 7 and 10), and a transmitter that maps its signal to such a constellation (e.g., as encompassed by claims 11 and 13-19), as a useful invention. The claimed invention encodes or transmits bits, itself a useful result to one skilled in the art. 35 USC 101 does not require novelty in the utility itself, so the utility requirement is satisfied even if the channel fading statistics were not incorporated as detailed at page 6 lines 4-8 into the signal constellation.

Nevertheless, the Applicant adds the clause transmitting the modulated signal to independent method claims 1 and 7, and a modulator and transmit antenna to independent transmitter claims 11, 14 and 17, all of which are rejected under 35 USC 101. These additions draw support from Figure 3 and related text at page 15, lines 10-28. For the multiple reasons recited above, the rejection under 35 USC 101 is seen as overcome.

The Office Action grounds the rejection to claim 1 under 35 USC 112, first paragraph, in the same reason as the utility rejection. For reasons cited above, this rejection is also seen as overcome. 35 USC 112, first paragraph, requires that the disclosure enable one of ordinary skill in the art to practice the claimed invention. The disclosure is seen as

enabling for the claimed aspect of separating constellation points of two mutually exclusive subsets by a distance based on a conditional distribution. See for example page 6 line 10 to page 15 line 8. If the Examiner's rejection for enablement is based on a different element of claim 1, the undersigned respectfully requests a more detailed statement by which to more fully respond.

Respecting the rejection to claim 1 under 35 USC 102, Park is not seen to disclose a signal constellation having points separated by a distance based on a conditional distribution as in claim 1. The Office Action cites to col. 1, line 38 of Park for this element. That passage recites that if bandwidth is restricted because input data is encoded to maximize the Euclidean distance between symbols, a higher coding gain may be obtained. It is not said how such a higher coding gain may be obtained. The Applicant notes that in the Office Action remarks under the utility rejection it is asserted that "the Euclidean distance can be characterized as a distance based on a conditional distribution." Since Park is not seen to disclose separation of constellation points by anything other than a Euclidean distance, the novelty rejection is taken with reference to the above quoted statement as an assertion that a Euclidean distance is a conditional distribution. As an initial matter, such an assertion is improper both by the plain meaning of the term conditional distribution used in the claims, the understanding one of ordinary skill would have of the term Euclidean distance (seen as properly characterized at page 1 line 26 to page 2 line 19 and Figures 1A-1D), and in view of the distinction made at page 5 line 31 to page 6 line 8; page 7 lines 16-19; and page 14 lines 6-15 of the written description. There is nothing seen as conditional in the distance between points whose separation is a maximized minimum Euclidean distance, as is common in the prior art. As stated in the Amendment dated January 21, 2005:

> If the position of both points is known absolutely, there is no conditional distribution; their locations are fixed with certainty. Said another way, the Euclidean distance between two points may be said, with 100% certainty, to span a distance x; a distance based on a conditional distribution between two points cannot be said with 100% certainty to be a particular value, and the amount of uncertainty depends from the underlying conditional distribution. In the conditional distribution is a probability density function as suggested in the written description, the location of at least one point may be considered the weighted probabilistic center of a distribution of possible locations for that constellation point. In such a case, the location of the point is "known" as being at the distribution's probabilistic center only within a confidence level that is less than 100%.

Certainly, one can measure a Euclidean distance between any two points in a constellation according to the present invention. It is NOT claimed that the distance between points is not measurable by Euclidean geometry after the points are set, but rather that the distance between them is BASED on a conditional distribution. The present constellations use the conditional distribution to determine the point's location, such as a probabilistic center of a distribution over a two or three-dimensional space. The distribution is conditional preferably on the channel's fading characteristics. Common prior art constellations separate constellation points by maximizing a minimum Euclidean distance between them; the resulting distance is based on that a priori Euclidean calculus, which is not conditional because a necessary condition to measuring a Euclidean distance between points is that the position of the measured points is fixed and known absolutely. The claimed constellations separate points by a conditional distribution; one distribution will result in one Euclidean distance between two points, another will result in a different Euclidean distance between those same two points. The transmitter may change those resulting Euclidean distances by changing the underlying probability or function that is used to set the position of those points. Those changes are preferably in response to different conditions of the fading channel, as above. In each case the resulting Euclidean distance that may be measured after the position of the points are determined is based on a conditional distribution that was used a priori to fix the position of those points.

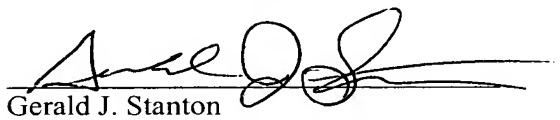
If in fact the Examiner considers that a Euclidean distance is a conditional distribution as the Office Action appears to indicate, the Applicant asserts that this is reading a limitation out of the claim and fails to find all claim elements in the Park reference as required under MPEP 2131. The applicant clearly distinguishes conditional distribution from Euclidean distance in the written description, in a manner consistent with the plain meaning of the terms. Park does not disclose a conditional distribution between constellation points either before they are positioned or after, but only a Euclidean distance, so claim 1 is therefore novel over Park.

Claims 3-6, 10, 13-16 and 21-22 are rejected under 35 USC 103 as obvious over Park in view of Ramchandran and Ramesh (Ramesh for claims 13-16 only). Neither Ramchandran nor Ramesh is seen to teach or suggest constellation points separated from

one another by a distance based on a conditional distribution, and the Office Action does not assert that either reference does. The above arguments respecting Park are therefore seen to overcome the obviousness rejections.

In light of the above arguments and claim amendments, the Applicant requests the Examiner to reconsider and withdraw the claim objections and rejections, and pass each of claims 1-23 to issue. The undersigned welcomes the opportunity to resolve any matters, formal or otherwise, via teleconference at the Examiner's discretion.

Respectfully submitted:



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